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S/N 09/871,130 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	ALLEN ET AL.	Examiner:	R. SHAFER
Serial No.:	09/871,130	Group Art Unit:	2872
Filed:	MAY 31, 2001	Docket No.:	54732US014 (7780.453USD1)
Title:	OPTICAL DEVICES USING REFLECTING POLARIZING MATERIALS		

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By: Teresa Anderson
Name: Teresa Anderson

APPELLANT'S BRIEF ON APPEAL

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Dear Sir:

This Brief is presented in support of the Notice of Appeal filed September 17, 2003, from the final rejection of claims 13, 25, 26 and 31 of the above-identified application, as set forth in the Office Action mailed June 17, 2003.

A check for $330.00 to cover the required fee for filing this Brief is enclosed. If an additional fee is required, please charge Deposit Account No. 13-2725. An original and two copies of the Brief are enclosed herewith. Applicant hereby requests an oral hearing. A request for an oral hearing under 37 C.F.R. § 1.194 will be submitted along with the fee within two months of the Examiner's Answer.

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I. REAL PARTY OF INTEREST

The Real Parties of Interest are 3M Company, formerly Minnesota Mining and Manufacturing Company, and 3M Innovative Properties Company, both Delaware corporations.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal for the above-referenced patent application.

III. STATUS OF CLAIMS

Claims 13 and 21-31 are pending. Claims 13, 25, 26 and 31 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,751,388 to Larson. Claims 21-24 and 27-31 are objected to. The rejected claims, claims 13, 25, 26 and 31 are the subject of this Appeal and are presented in Appendix 1. All pending claims 13 and 21-31 are presented in Appendix 2.

IV. STATUS OF AMENDMENTS AFTER FINAL REJECTION

No amendments were filed after the final Office Action was mailed on June 17, 2003.

V. SUMMARY OF THE INVENTION

Independent claims 13 and 26 both describe a display apparatus including a light cavity, where the light cavity reflects incident light with a first degree of depolarization. The display apparatus also includes a diffusely reflecting polarizer that transmits a component of light having a first polarization and diffusely reflects a component of light having a second polarization. When the polarizer reflects the light of the second polarization it does so with a second degree of depolarization that is greater than the first degree of depolarization. This relationship between the degree of depolarization upon reflection of the light cavity and the diffusely reflecting polarizer is the focus of the arguments for patentability.

One example of a display apparatus of the present invention is shown in FIG. 1A and described at pages 6, line 6 to page 8, line 5 of the application. FIG. 1A is reproduced below in Illustration A. The exemplary display apparatus 100 includes a light modulating system 130 and

an optical cavity 120 for providing light to the light modulating system and for illuminating the apparatus.

Illustration A: FIG. 1A of the Application

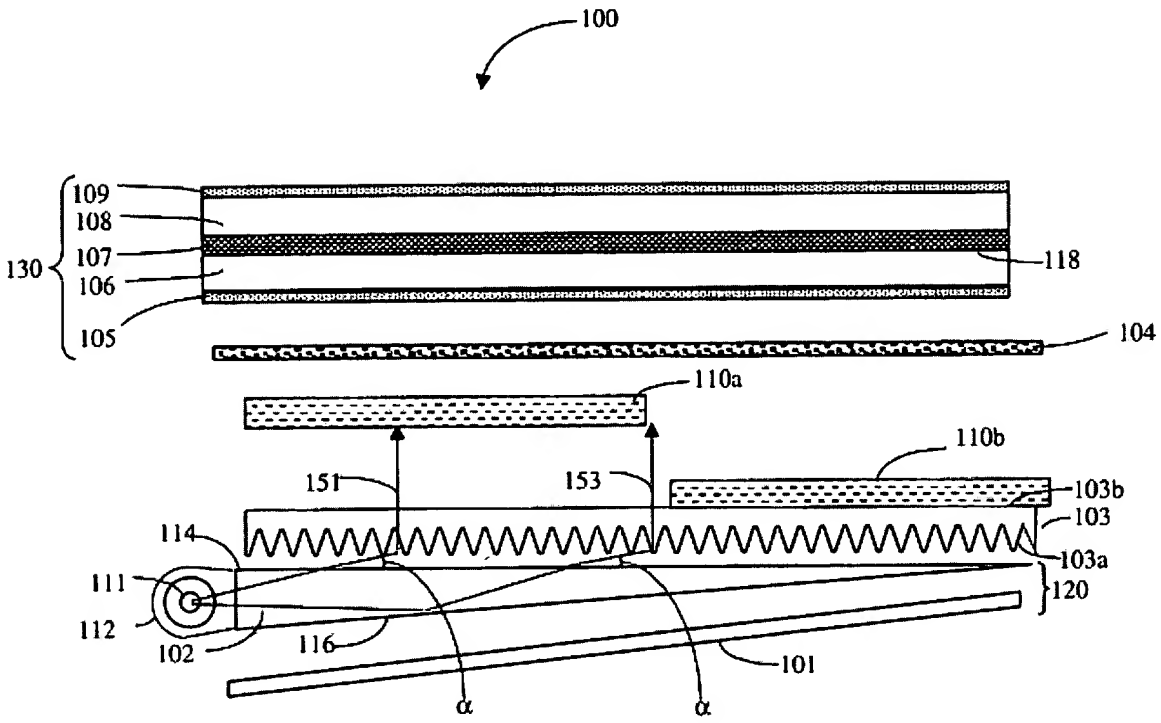


Fig. 1A

The light modulating system 130 includes a light modulating layer 107 such as, for example, a liquid crystal light modulating layer. The optical cavity 120 typically includes a light source 111 and a light guide 102 for receiving light from the light source 111. In operation, light from light source 111 is directed, with the aid of reflector 112, into light guide 102. (Application, page 6, lines 20-21). The light cavity reflects incident light with a first degree of depolarization of the incident light.

The display apparatus of the invention further includes a diffusely reflecting polarizer 110a or 110b disposed between the optical or light cavity 120 and the light modulating layer 107.

The diffusely reflecting polarizer 110a or 110b may either be spaced from or attached to the adjacent turning lens 103, respectively, among other options. (Application, page 7, lines 22-25). The diffusely reflecting polarizer receives the redirected light, transmits a component of the redirected light having a first polarization toward the light modulating layer 107 and diffusely reflects a component of the redirected light having a second polarization different than the first polarization toward the light guide 102 (Application, page 7, lines 17-21).

The diffusely reflecting polarizer and optical cavity 120 may be optimized for light recycling. The diffusely reflecting polarizer layer diffusely reflects light of the second polarization such that the reflected light has a second degree of depolarization. Due to depolarization, the reflected light includes a component of the desired first polarization. The reflected light is re-reflected with the first degree of depolarization by optical cavity 120. The second degree of depolarization is greater than the first degree of depolarization that occurs on reflection from the light cavity. Re-reflected light of the first polarization subsequently transmits through the diffusely reflecting polarizer and re-reflected light of the second polarization is diffusely reflected and partially depolarized to continue the recycling process. As a result, more of the light produced by the light source 111 is utilized by the display apparatus 100. In addition, recycling of the light reflected by the diffusely reflecting polarizing layer over a variety of different optical paths tends to even out variations in illumination that sometimes occur in backlight illuminators.

VI. ISSUES PRESENTED FOR REVIEW

Claims 13, 25, 26 and 31 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,751,388 to Larson. The issues presented for review:

A. Whether claim 13 is unpatentable under 35 U.S.C. § 102(b) over Larson, specifically, whether Larson teaches a diffusely reflecting polarizer that transmits a component of light from a light cavity having a first polarization and diffusely reflects a component of the light, received from the light cavity, having a second polarization, where the second degree of depolarization is greater than a first degree of depolarization with which the light cavity reflects incident light, and

B. Whether claim 26 is further patentable over 35 U.S.C. § 102(b) over Larson, specifically, whether Larson teaches a first degree of depolarization of the light cavity to be substantially zero.

VII. GROUPING OF CLAIMS

Claims 13 and 26 do not stand and fall together and should be considered seperately in this Appeal. Both claims 13 and 26 include an element that is not taught by Larson, namely, a display apparatus including a light cavity that reflects incident light with a first degree of depolarization for incident light of a first polarization and a diffusely reflecting polarizer that receives light provided by the light cavity and diffusely reflects a component of the light having a second polarization, where the polarizer diffusely reflects the light of the second polarization with a second degree of depolarization that is greater than the first degree of depolarization. In addition, claim 26 further states that the first degree of depolarization is substantially zero and that at least a portion of the diffusely reflecting light of the first polarization is reflected by the light cavity without substantial depolarization toward the diffusely reflecting polarizer for transmission through it. Larson does not teach that its light cavity reflects without substantial depolarization so claim 26 is further patentable over Larson for this reason.

VIII. ARGUMENT

Claims 13 and 26 relate to a display apparatus including a light cavity, where the light cavity reflects incident light with a first degree of depolarization. The display apparatus also includes a diffusely reflecting polarizer that transmits a component of light having a first polarization and diffusely reflects a component of light having a second polarization. When the polarizer reflects the light of the second polarization it does so with a second degree of depolarization that is greater than the first degree of depolarization. Therefore, the diffusely reflecting polarizer provides some change in polarization upon reflection while the light cavity is more polarization preserving than the polarizer. As a result, at least a portion of the diffusely reflected light of the first polarization (e.g. resulting from the depolarization from reflection from the diffusely reflecting polarizer) is reflected by the light cavity without depolarization toward the polarizer for transmission there through.

In the final office action, the Examiner refers to Figure 4 of Larson, reproduced below as Illustration B, and argues that the diffusely reflecting polarizer of claims 13 and 26 is taught by the backscattering polarization sensitive scattering element (PSSE) 109.

Illustration B. Figure 4 of Larson

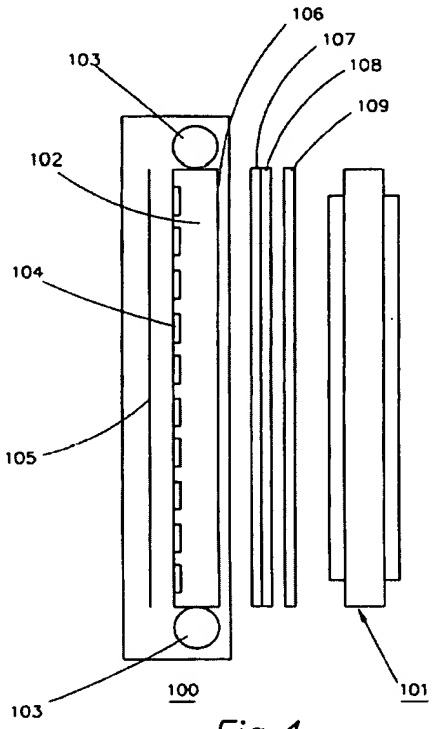


Fig. 4

In paragraph 1 of the final office action, the Examiner states that the features upon which the applicant relies are not recited in the rejected claims. However, Applicants would like to specifically point out that the feature that is being relied up is recited in the claims. Independent claims 13 and 26 both describe a display apparatus including a light cavity, where the light cavity reflects incident light with a first degree of depolarization. (Lines 3-4 of claim 13, Lines 3-5 of claim 26.) The display apparatus also includes a diffusely reflecting polarizer that transmits a component of light having a first polarization and diffusely reflects a component of light having a second polarization. (Lines 5-8 of claim 13, Lines 6-8 of claim 26.) When the polarizer reflects the light of the second polarization it does so with a second degree of depolarization that is greater than the first degree of depolarization. (Lines 8-10 of claim 13,

Lines 9-11 of claim 26.) This relationship between the degree of depolarization upon reflection of the light cavity and the diffusely reflecting polarizer is the focus of the arguments for patentability.

In paragraph 2 of the final office action, the Examiner states that the claim language does not "preclude" PSSE 109 from Figure 4 of Larson from meeting the claim limitations. The Examiner points to the fact that the polarization-sensitive scattering element 109 transmits the majority of light along one optical axis and scatters the majority of light orthogonal to the optical axis back to the light cavity. These comments do not relate to the amount that the PSSE 109 would change the polarization of the light it reflects. The Larson reference is silent on this characteristic.

In order to obtain more information about the basis for the rejection, Applicants conducted an interview with the Examiner on August 21, 2003. Based on the interview and as set forth in the Office Action and as discussed in the telephone interview with the Examiner, the Examiner's position is that it is possible that the structure shown in Figure 4 of Larson might meet the limitations in the claim. However, Applicants respectfully submit that the rejection should be withdrawn because there is no teaching in Larson that the structure described in Figure 4 of Larson would meet the claim limitations.

There are three possibilities for the relationships in depolarization upon reflection between the PSSE and the backlight of Larson:

1. Backlight is more depolarizing than PSSE,
2. PSSE and backlight are equally depolarizing, or
3. PSSE is more depolarizing than backlight.

As mentioned above, no teaching in Larson indicates which of these three possibilities is true in Figure 4. Larson does state that the components of the backlight are selected to be non-depolarizing (Larson, Col. 10, lines 10-12), but does not contain any teaching about the degree of depolarization upon reflection of the PSSE.

Federal Circuit cases have made it clear that a prior art reference should not be assumed to inherently disclose a particular property merely because the prior art reference discloses the same structure as the claimed invention. Crown Operations International, Ltd. v. Solutia Inc., 62 USPQ2d 1917 (Fed. Cir. 2002). In Crown Operations, the claims at issue were directed to a solar and safety control glass with minimal visual distortion. The claims specified that the

visible reflections contribution of the solar control film layer could be no more than about 2%. The alleged infringer, Crown Operations, argued that the 2% limitation was inherently present in the prior art teachings because the prior art disclosed an assembly with the same layers, composition, and thicknesses as the films disclosed in the patent. Crown Operations argued, therefore, that the prior art patent must inherently disclose a 2% limitation because the structure, thickness and materials of the assembly were the same or within the same ranges as the claimed invention. However, the Federal Circuit rejected this reasoning as not being in accordance with prior Federal Circuit cases on inherency.

For a limitation to be inherently disclosed by the prior art, it must be necessarily present and a person of ordinary skill in the art would recognize its presence. Id. at 1922-1923. Inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." Id. at 1923, quoting Continental Can Co. USA, Inc. v. Monsanto Co., 20 USPQ2d 1746, 1749 (Fed. Cir. 1991).

Similar to the situation in Crown Operations, in the claims at issue in this application, the claimed limitations are not necessarily present in the Larson patent. The Federal Circuit has ruled in Crown Operations and in other cases that an anticipation finding is not appropriate unless the claimed characteristic is necessarily present and a person of ordinary skill in the art would recognize its presence.

The Court of Customs and Patent Appeals addressed a similar situation in In re Oelrich and Divigard, 212 USPQ 323 (C.C.P.A. 1981), where the claims were directed to an apparatus specially adapted for moving low inertia steering fins on guided missiles. The asserted prior art taught the use of a high inertia load system operated at above the critical (resonant) frequency of the system.

In Oelrich, the important claim feature was a "means for generating a * * * carrier frequency * * * greater than the maximum dynamic command signal frequency and *less than* the minimum system resonant frequency." Id. at 325 (emphasis in original). Both the applicant and the USPTO agreed that the claimed carrier frequency that could be used in the low inertia system described in the application *might have* fallen within the range of carrier frequencies usable in the prior art high inertia system. Id. at 325. Therefore, the USPTO urged that the prior art inherently performed the function of the apparatus of claim 1. Id. at 325. However, the CCPA concluded that the relationship between the carrier frequency and the system critical frequency

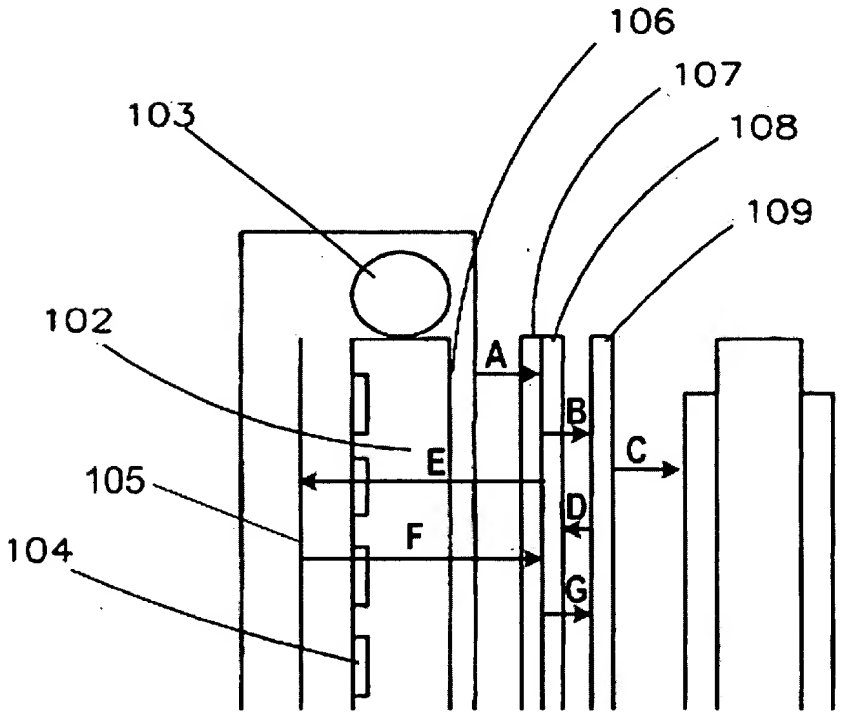
could not be said to be "the natural result flowing from the operation as taught." Id. at 326. As a result, the claim was not found to be inherently anticipated. It was not enough that the claimed features *might have* been present in the prior art.

To establish a prima facie case of inherency to shift a burden of proof to the Applicant, the USPTO must show that the elements of the claim have been preliminarily established and provide technical reasoning and a basis in fact to support a determination of inherency. Ex Parte Levy, 17 USPQ2d 1461, 1464 (Bd. of Patent Appeals and Interferences 1990), citing In re King, 231 USPQ 136 (Fed. Cir. 1986) and other cases. In the present application, the Examiner has not provided the required technical reasoning or basis in fact to support an assertion that the PSSE of Larson is more depolarizing upon reflection than the backlight in Larson, or that this is the natural result flowing from what is taught in Larson. As a result, Larson does not inherently anticipate claims 13 and 26. It is not enough that the claimed features *might be* present in Larson.

It is useful to trace the path of light from the backlight 100 through the structure shown in Figure 4 of Larson to better understand that Larson does not teach the claim elements. The path of light through Figure 4 of Larson is as described in Column 9, line 58 through Column 10, line 27 in Larson. Please see below as Illustration C a portion of Figure 4 from Larson with light rays A-G added. First, unpolarized polarized light ray A leaves backlight 100 and passes through diffuser 107, then through retarder 108. Light ray B that emerges from retarder 108 is circularly polarized. Circularly polarized light ray B strikes the PSSE 109. As a result, light ray C of a first polarization passes through the PSSE. Light ray D of a second orthogonal polarization is reflected from the PSSE.

Illustration C. Figure 4 from Larson with light rays added

Figure 4
From U.S. Patent 5,751,388



Larson does not discuss the degree of depolarization upon reflection from PSSE. In other words, Larson does not discuss whether any or how much of light ray D is not of the second orthogonal polarization after reflection. Larson simply states that the PSSE returns the majority of light having the orthogonal polarization to the backlight cavity. Larson, Col. 4, lines 46-52.

After leaving the PSSE, light ray D of the second polarization goes through the retarder 108 and is converted to circular polarization (light ray E). Light ray E is then reflected from mirror 105 so that the circular handedness of the polarization is reversed. Then light ray F is subsequently converted to match the pass-axis of the PSSE by the next pass through retarder 108 (light ray G).

In summary, the PSSE 109 reflects or backscatters light of one polarization (light ray D) and the quarterwave retarder 108 and the mirror 105 work together to alter the polarization before the light is again transmitted to the PSSE. Of note, it would not be advantageous for light ray D to be depolarized upon reflection from the PSSE and therefore consist of less of the second polarization that would be available for conversion by the backlight and the retarder.

In the telephone interview of August 21, 2003, the Examiner mentioned his belief that because the PSSE of Larson has diffusing characteristics upon reflection that it would inherently have some depolarization upon reflection. As a result, the Examiner felt that the degree of depolarization upon reflection from the PSSE would inherently be greater than that of the light cavity, because the light cavity is mentioned as having elements selected to be non-depolarizing. However, Applicants note that the backlight also has a diffusing characteristic, and includes diffusing regions 104. Since both the backlight and the PSSE are diffusing, the fact that the PSSE has a diffusing character does not indicate that it will have a higher degree of depolarization upon reflection than the backlight.

Claim 26 relates to a display apparatus including a light cavity that reflects incident light with a first degree of depolarization for incident light of a first polarization. The display apparatus of claim 26 also includes a diffusely reflecting polarizer that reflects light of a second polarization with a second degree of depolarization greater than the first degree of depolarization. In claim 26, the first degree of depolarization is specified to be substantially zero. In contrast, Larson does not teach that the PSSE reflects or backscatters incident light with a degree of depolarization larger than that caused by reflector from the light cavity. The diffusing regions 104 in the backlight 101 tend to depolarize some of the light that they scatter or deflect, so the backlight 100 will not have a degree of depolarization that is substantially zero.

For the reasons discussed above, claims 13 and 26 are respectfully submitted to be in condition for allowance and patentable over Larson. For at least the same reasons, dependent claims 21-25 and 27-31 are also believed to be in condition for allowance. A notice of allowance is respectfully requested.

Respectfully submitted,

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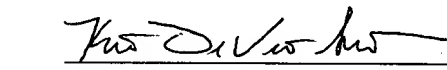

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Appendix I

Claims on Appeal 13, 25, 26 and 31

13. A display apparatus, comprising:

a light modulating layer;

a light cavity adapted to provide light to the light modulating layer, the light cavity reflecting incident light with a first degree of depolarization of the incident light; and

a diffusely reflecting polarizer, disposed between the light modulating layer and the light cavity, for transmitting a component of the light provided by the light cavity having a first polarization for viewing and diffusely reflecting a component of the light, received from the light cavity, having a second polarization, the polarizer diffusely reflecting the light of the second polarization with a second degree of depolarization greater than the first degree of depolarization to provide light of the first polarization;

wherein at least a portion of the diffusely reflected light of the first polarization is reflected by the light cavity without depolarization toward the diffusely reflecting polarizer for transmission therethrough.

25. The display apparatus of claim 13 wherein the second degree of depolarization is about 25%.

26. A display apparatus, comprising:

a light modulating layer;

a light cavity adapted to provide light to the light modulating layer, the light cavity reflecting incident light with a first degree of depolarization for incident light of a first polarization; and

a diffusely reflecting polarizer, disposed between the light modulating layer and the light cavity, for transmitting a component of the light provided by the light cavity having the first polarization for viewing and diffusely reflecting a component of the light, received from the light cavity, having a second polarization, the polarizer diffusely

reflecting the light of the second polarization with a second degree of depolarization greater than the first degree of depolarization to provide light of the first polarization;

wherein the first degree of depolarization for incident light of the first polarization is substantially zero and at least a portion of the diffusely reflected light of the first polarization is reflected by the light cavity without substantial depolarization toward the diffusely reflecting polarizer for transmission therethrough.

31. The display apparatus of claim 26 wherein the second degree of depolarization is about 25%.

Appendix II

Pending Claims 13 and 21-31

13. A display apparatus, comprising:

a light modulating layer;

a light cavity adapted to provide light to the light modulating layer, the light cavity reflecting incident light with a first degree of depolarization of the incident light; and

a diffusely reflecting polarizer, disposed between the light modulating layer and the light cavity, for transmitting a component of the light provided by the light cavity having a first polarization for viewing and diffusely reflecting a component of the light, received from the light cavity, having a second polarization, the polarizer diffusely reflecting the light of the second polarization with a second degree of depolarization greater than the first degree of depolarization to provide light of the first polarization;

wherein at least a portion of the diffusely reflected light of the first polarization is reflected by the light cavity without depolarization toward the diffusely reflecting polarizer for transmission therethrough.

21. The display apparatus of claim 13 further comprising a turning lens disposed to receive low angle light output from the light cavity and redirect the light toward the light modulating layer.

22. The display apparatus of claim 21 wherein the turning lens includes a relatively planar surface on a first side and a structured surface on a second side opposite to the first side.

23. The display apparatus of claim 22 wherein the relatively planar surface of the turning lens faces the diffusely reflecting polarizer and the structured surface of the turning lens faces the light cavity.

24. The display apparatus of claim 13 further comprising a diffusion layer disposed between the diffusely reflecting polarizer and the light modulating layer for diffusing light transmitted by the diffusely reflecting polarizer.

25. The display apparatus of claim 13 wherein the second degree of depolarization is about 25%.

26. A display apparatus, comprising:

a light modulating layer;

a light cavity adapted to provide light to the light modulating layer, the light cavity reflecting incident light with a first degree of depolarization for incident light of a first polarization; and

a diffusely reflecting polarizer, disposed between the light modulating layer and the light cavity, for transmitting a component of the light provided by the light cavity having the first polarization for viewing and diffusely reflecting a component of the light, received from the light cavity, having a second polarization, the polarizer diffusely reflecting the light of the second polarization with a second degree of depolarization greater than the first degree of depolarization to provide light of the first polarization;

wherein the first degree of depolarization for incident light of the first polarization is substantially zero and at least a portion of the diffusely reflected light of the first polarization is reflected by the light cavity without substantial depolarization toward the diffusely reflecting polarizer for transmission therethrough.

27. The display apparatus of claim 26 further comprising a turning lens disposed to receive low angle light output from the light cavity and redirect the light toward the light modulating layer.

28. The display apparatus of claim 27 wherein the turning lens includes a relatively planar surface on a first side and a structured surface on a second side opposite to the first side.

29. The display apparatus of claim 28 wherein the relatively planar surface of the turning lens faces the diffusely reflecting polarizer and the structured surface of the turning lens faces the light cavity.

30. The display apparatus of claim 26 further comprising a diffusion layer disposed between the diffusely reflecting polarizer and the light modulating layer for diffusing light transmitted by the diffusely reflecting polarizer.

31. The display apparatus of claim 26 wherein the second degree of depolarization is about 25%.

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Appendix III

Cases Cited

Continental Can Co. USA, Inc. v. Monsanto Co., 20 USPQ2d 1746 (Fed. Cir. 1991)

Crown Operations International, Ltd. v. Solutia Inc., 62 USPQ2d 1917 (Fed. Cir. 2002)

Ex Parte Levy, 17 USPQ2d 1461 (Bd. of Patent Appeals and Interferences 1990)

In re King, 231 USPQ 136 (Fed. Cir. 1986)

In re Oelrich and Divigard, 212 USPQ 323 (C.C.P.A. 1981)